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EDITORIAL.

PREMATURE SPECIALIZATION CONDEMNED.

What more ridiculous attitude is there towards the study of medicine than that tendency toward premature specialization occasionally seen among students in the clinical years. The division of medical science into medicine and surgery is a highly artificial one and has come about as a matter of expediency.

When a practitioner styles himself physician, surgeon, or obstetrician, he does not, or should not, mean that he is not responsible for the recognition of conditions not commonly classed under the heading of his specialty. It is apparent even to undergraduates that the so-called specialist must constantly fight against a tendency to think always in terms of his specialty. A sick person is not a medical case or a surgical case, but is a human being subject to any diseases which may affect man.

Therefore, since it is inexcusable for any practitioner, specialist or otherwise, to examine one system to the exclusion of others or to think only of certain groups of conditions commonly classed under his specialty, it is much more inexcusable for a student to pay attention to one branch of medicine to the exclusion of the others.

In minor degrees this is common among medical students, but occasionally it becomes so marked that it is a distinct menace to our patrons—the people. It is a sign of a narrow mind and a stupid one.

Our predecessors in medicine have wisely given us a complete, well-balanced course. Let us take full advantage of it in each department.

DR. DRAKE'S CONTRIBUTION.

In the last issue the question of post-graduate work was discussed. Following up this pertinent matter, we would like to draw attention to a note in the preface of the recent volume, "Common Procedures in the Practice of Paediatrics," in which great tribute is given to T. G. H. Drake, M.B., former resident of the Hospital for Sick Children, for his invaluable assistance in the collection of many procedures.

Dr. Drake is a splendid example of one who has done extensive post-graduate work and already proves what a great value that study is going to be to Paediatrics as a whole as well as in his own practice. He has set a standard which should be easily attained by others who realize the opportunities about them and are willing to co-operate.

SCIENCE IN MEDICINE.

Professor Macleod's article, which appears for the first time in print in this issue, besides being an excellent outline of the origin and development of modern medicine, is prophetic in its conclusion, and for these reasons should be carefully read and given careful thought. We are pleased to have the opportunity of publishing this most excellent address.

VOL. IV. FREE.

Mr. G. M. Fletcher, 2T8, has been awarded Volume IV. for his article on Epiphyses which appeared in our January issue.

Mr. D. R. Mitchell, 2T7, has been awarded the same for his article on Flat Feet in the present issue.

MEDICAL LIBRARIES TO WHICH UNDERGRADUATES IN TORONTO HAVE ACCESS.

(1) UNIVERSITY LIBRARY.

This library is of great use to the men in the early years of Medicine and to those doing medical research work. From experience, it is of little service in studying clinical medicine. Many of the Journals which belong to the University are deposited in the Students' Medical Library and in the library in the pathology building. Consequently, medical literature in the university library building is confined to standard text books, used by many of the Junior Years in the reading-room, and to scientific medical literature in French, German, etc. The rarer and less used periodicals are stacked in this building.

(2) STUDENTS' MEDICAL LIBRARY, ROOM 17, MEDICAL BUILDING.

This is the library most used by those of the pre-clinical years. It contains the bound volumes but not the current numbers of all the journals of physiology and biochemistry published in English. In addition bound volumes of the leading publications in French and German in these subjects are on the shelves. The current numbers of the British Medical Journal, Lancet, Journal of Canadian Medical Association and Journal of the American Medical Association, etc., are on the table, but the bound volumes are in the library in the pathology building. Here may be found physiological abstracts and physiological reviews, both current numbers and bound volumes. Index Medicus is in this library; but the more useful Quarterly Cumulative Index is, strange to say, safely interred in the basement of the University Library, where it is so much trouble to get that it is hardly worth while trying.

Miss Grange of the Dept. of Physiology conducts a students' reading club. On payment of one dollar a list of text-books and reference books in furnished and the student may take out these books and read them at his leisure. A great many of these books are the personal property of Professor MacLeod and other members of the staff; the balance are purchased with the money received from membership fees in the Club. This library furnishes real service to students.

RIGOR MORTIS.

The belief that lactic acid is the essential feature causing rigor mortis has been shattered by the recent observations of Hoet and Marks. These observers found that after severe insulin convulsions or after prolonged feeding with thyroid gland, a weak and evanescent form of rigor mortis set in immediately after death and that the muscles in these cases exhibited an alkaline reaction. In both of these cases there was an almost complete absence of glycogen and a decrease in the lactacidogen content of the muscles. Hoet and Marks conclude that the disappearance from the muscle of hexose phosphate through failure of resynthesis leads to the onset of rigor while lactic acid determines the amount of shortening and tension developed by the muscle when rigor appears. Thus in normal muscle the resynthesis of hexose phosphate continues for a short time after death at the expense of glycogen, so that the onset of rigor is somewhat delayed; but since this rigor occurs in the presence of much lactic acid, it is of a strong and persistent type. On the other hand, when resynthesis fails to occur through lack of glycogen in the muscles, rigor sets in immediately after death, but since it takes place in the presence of little lactic acid, the rigor is weak and evanescent.

I.L.C.

THE FACIES HIPPOCRATICA.

Hippocrates, the Grecian sage,
Adored the verdant young greengage.
Alas, one day our sage was seen
To eat no less than seventeen. .
Appalling must his pains have been;
His face no longer calm, serene,
Assumed a simply ghastly green;
And his expression symptomatic,
Has since been known as Hippocratic.

—St. Bartholomew's Hospital Journal.
May, 1922.

Science in Medicine.*

BY J. J. R. MACLEOD.

IT has been said that the medical discoveries of the past few decades outweigh in importance all those of preceding ages, and so they may if we regard only the application of scientific principles in the prevention and cure of disease. The almost complete elimination in most countries of those diseases which in older times were among the most dreadful of the scourges of mankind, and the remarkable extension of the span of life are achievements of such comparatively recent date that we are apt to be so dazzled by their brilliance as to fail to recognize that they are the outcome of the long and patient endeavour which went before. We forget that it is through the efforts of our forefathers, groping in the darkness of unscientific ages, that we are now able to link the method of the scientist with the art of the physician in the alleviation of human suffering, and I do not know of any nobler expression of what our attitude towards medical history should be than that made by Hippocrates over 2,000 years ago. "But on that account, I say, we ought not to reject ancient art, as if it were not, and had not been properly founded, because it did not attain accuracy in all things, but rather, since it is capable of reaching to the greatest exactitude by reasoning, to receive it and admire its discoveries, made from a state of great importance, and as having been well and properly made, and not from chance." Hippocrates is referring to the superstition, the occultism and the magic of Egyptian and early Grecian medicine, which must have seemed to him to be as useless in the advancement of a true knowledge of disease as to us now appear the practices of the physicians of his own times. Relativity applies in history as in science. What seem to us to-day to be self-evident truths were but yesterday unfathomable mysteries. Like the advancing tide, there is no steady rising of the sea of knowledge, but each wave rises only so far and then recedes, to return again later, it may be farther, it may be not so far as the preceding one; but yet the tide surely creeps up.

A physician unfamiliar with the past and with the successes and failures of his spiritual forefathers, and who does not place his modern knowledge against a background of what has gone before, cannot have a full appreciation of his inheritance of knowledge. True, it may be that many of the rocks of ignorance and superstition which the tide of advancing knowledge had to beat against in bygone ages are now submerged, and the waves are breaking against others higher up the shores of time. But the hidden rocks are still there, and he who would gain the haven of modern knowledge must know his course among the hidden rocks, else will he surely founder and come to grief, wrecked through ignorance of the problems of the past.

I have chosen as the centre theme of my remarks an outline of the outstanding events in medical history which have been the starting points of the great developments of our own times, and I have ventured to do this because I imagine that few outside the medical profession know of the compelling human interest there is in the subject. But first of all allow me to draw a contrast between the old and the new in medical practice. I cannot do this better than by quoting from a statement prepared by a well-known physician of this city, who spent his earlier years of practice in the country. "About twenty-five years ago, while a physician in a small town in Ontario, I was called to the country to see a child dying of diphtheria after an illness of only two days. A week later I was again called, this time to see the father. It was only too evident that he had the same virulent type of diphtheria. I was powerless and I knew it. The second funeral was scarcely over when a third summons came. I found the widowed mother holding a nine-months old infant in her arms. I can even now, after twenty-five years, recall her face as she said, "For God's sake don't tell me my baby has diphtheria." The case seemed

*A Lecture Delivered Before the Royal Canadian Institute.

to be quite as hopeless as the other two. It was in the early days of antitoxin, a serum discovered and prepared by animal experimentation. I had little faith in it, and was afraid to use it anyway. However, I discussed it frankly with the mother and she with the courage of despair, insisted. The baby's life was saved, and also another case which occurred in the house a fortnight later. It was the beginning of a better day in the treatment of diphtheria."

This is only one of many diseases which have been practically robbed of their fearful toll in human life, through the developments of medical science. Few realize how great the difference really is between the disease mortality of a few centuries ago and the healthfulness of the present age. In the year 1667, when the city of London had somewhat less than the present population of Toronto, 1,300 died of smallpox, 2,000 of cholera, 3,000 of tuberculosis or phthisis, and only 1,000 of old age. Nor do these figures compare in fearfulness with those prevailing two years earlier, when one-fifth of all the inhabitants of London fell helpless victims to the plague. Of all these diseases tuberculosis is the only one that is at all common to-day, and its toll in human lives is fast diminishing.

But I need not dwell longer on the contrasts between the old and the new in Medicine; it is surely realized by all that there is no single factor whose influence in the development of modern civilization and in the happiness and welfare of mankind can for a moment be compared in importance with that which has been contributed by medical science. Tropical countries, previously deathtraps for man because of yellow fever and malaria, are now rid of all these terrors. For the white man they have been changed from graveyards into gardens. But how many are there who have any interest in the historical background of our inheritance of medical knowledge?

I imagine but very few, and I believe that it is through this lack of any knowledge of the history of medicine that it is possible, even in these enlightened days of ours, for quacks and charlatans to thrive and to find victims for their uncertain cures. Surely if anything at all were known of the efforts that have been made through many centuries in the study of disease, by patient observation, by failure and success in treatment, by searching for its hidden causes through the aid of science, these untutored theorists could not continue to prey on the credulity and ignorance of their fellow-men.

In what, then, you ask, does this history of medical science consist? What are its main lines of development? What can we as laymen learn from it that will help us to judge between the true and the false in medical practice? Within the narrow limits of an address such as this I cannot, of course, tell you much, but I will try to pull aside the curtain of time for a brief moment on one or two of the earlier scenes on the stage of medical history, so that you may be the better able to follow what is happening in the setting of to-day.

Medical science as we now know it, is the outcome of a gradual development of knowledge extending back through the centuries to Hippocrates who lived at a time when the intellectual development of Greece was at its highest, the times of Socrates and Plato. By careful observation of the symptoms of disease and their classification, Hippocrates has gained for himself the title of the father of medicine. To observe and record the symptoms of disease, to co-ordinate and group them, to interpret their significance, and then to direct treatment so as to allow the natural defensive agencies of the body to unfold their actions, these ideals formed the keynote of the teaching of this great man. But the note was not strong enough to sound for long, and with the decline of Greek culture the methods of Hippocrates fell into disuse and his ideals came almost to be forgotten. It was not indeed until the 15th century, when the Renaissance had gained its full momentum, that more was added to the foundations which Hippocrates had laid. They became covered up, through the dark ages, with vague and unsupported theories of disease, handed down mainly by Galen with whose writings, appearing about four centuries after Hippocrates, the Grecian period of medical history comes to an end.

A versatile, many-sided man of talent, full of zeal and industry, Galen wrote a versatile encyclopedia of the medical knowledge of his times, but his recorded clinical

observations fell far below the standards set by Hippocrates, his descriptions of the structure of the human body, based, as they were, on the dissections of the lower animals, were inaccurate, and his teachings of function, visionary, indefinite and misleading. For nearly 14 centuries Galen's writings were accepted as finalities in the world of science. This was the age of authority. Whatever Galen said must be the truth; if actual observation should reveal other than what was written, then the observation must err, Galen could not.

The first real advance came, not in the study of disease itself, but in that of the structure of the human body, and the birth of this new science of anatomy, must I think be considered as the greatest single event in the history of modern medicine. With the very earliest dawn of the Renaissance of learning some attention was coming to be paid to the structure of the human body, but at first all that was attempted was to demonstrate the teachings of Galen on rudely dissected bodies. Very formal indeed were the anatomy lectures of these times; the Professor in his robes of office, seated often on a sort of throne, and surrounded by his pupils, read from Galen while the body, not infrequently of some victim of the hangman, was rudely cut up by barber surgeons under his direction, to verify what Galen said. At one of these demonstrations Vesalius, then a student at the University of Paris, became so annoyed and incensed at the perfectly obvious discrepancies between what could be seen and what was being read that he broke through the formality of the occasion and, rudely pushing aside the unskilled barbers, he demonstrated by his own dissection that even Galen could err. Authority was called in question. The dogmatism of Galen's teaching was displaced by the spirit of inquiry and research, and when Vesalius found opportunity, under the benevolent protection of the Republic of Venice to continue in his researches in Padua, anatomy assumed the dignity of an exact science. The renaissance of scientific medicine had begun.

The fame of Vesalius and of the school which he established soon spread throughout the learned world, and among those who went to Padua for what we should now style a post-graduate course was one, William Harvey, formerly a student in Caius and Gonville College in Cambridge. Bold as Vesalius had been in breaking down the authority of Galen with regard to anatomy, he had not ventured more than to doubt the truth of his teachings with regard to function. He still taught, although with a distinct note of doubt and scepticism, that the blood merely ebbed and flowed along the blood vessels from the heart, where resided the fire of life which endowed it with spirits and which gave rise to vapours which were cooled off in the lungs by breathing. There was no suspicion that the heart is a pump for driving the blood in a continuous stream through the lungs to be purified, and through the arteries to the tissues and back to the heart by the veins so that food and oxygen might be carried to the tissues.

The essential features of Harvey's discovery is contained in a few sentences selected from a lecture delivered early in his career. "It is plain from the structure of the heart that the blood is passed continuously through the lungs to the aorta as by the two clacks of a water bellows to raise water." "It is shown by the application of a ligature that the passage of the blood is from the arteries into the veins." "Whence it follows that the movement of the blood is constantly in a circle, and is brought about by the beat of the heart." Such a view was so at variance with the teachings of Galen that it required much more than mere dissection of dead animals to uproot it. It required experiments on living animals. The pump had to be studied in action before its mechanism could be understood, and it was exactly this that Harvey did, and by so doing introduced the experimental method in the study of animal function, which in recent years has contributed so much to the advancement in medical knowledge and to the alleviation of human suffering. Permit me here to quote again from Harvey: "When by many dissections of living animals, as they came to hand, I first gave myself to observing how I might discover with my own eyes, and not from books and the writings of other men, the use and purpose of the movement of the heart in animals, forthwith I found the mat-

ter hard indeed, and full of difficulty; so that I began to think with Frascatorius, that the movement of the heart was known to God alone." And again: "At last, having daily used greater disquisition and diligence, by frequent examination of many and various living animals—and many observations put together, I came to believe that I had succeeded, and had escaped and got out of this labyrinth, and therewith had discovered what I desired, the movement and use of the heart and arteries."

With the new standards set in anatomy and physiology by Vesalius and Harvey the dark ages in medicine come to an end and the modern era starts. But you ask, what has all this to do with the history of medicine itself? How did the new knowledge help physicians and surgeons in their efforts to cure disease or give comfort to the sick? About the time that Vesalius and Harvey were busy with their researches, investigation of the causes and the treatment of disease was still being conducted by methods that were far below the standards laid down by Hippocrates, and the first step towards emancipation from the thraldom of the teachings of Galen and his commentators was taken by a curious character in the history of medicine, Theophrastus Bombast von Hohenheim, or as he styled himself, Paracelsus. Entirely out of sympathy with the orthodox practices of the times, despising the new anatomy, casting aside with ridicule the teachings of Galen, although leaning to those of Hippocrates, Paracelsus wandered from place to place, the companion of gypsies, soothsayers and beggars, barbers and midwives, treating disease by methods of his own, and by often curing where the orthodox physicians had failed, he acquired a great reputation as a healer. While philosophy, alchemy and astrology were the pillars of his faith, Paracelsus' watchword in practice was "experimentation controlled by the authoritative literature" and through being well versed in all that was then known of chemistry, he discovered several of our most powerful remedies, such as the salts of mercury and arsenic, and he was the first to use laudanum. But looking back from our vantage point of time, perhaps the greatest thing that we can credit to this much-talked-of man was his insistence of the importance of chemical processes in the control of the functions of the body. Remedies, he believed, acted by controlling these chemical processes and he built up a system of therapy which was based on this principle.

Although visionary and mystical in the extreme, Paracelsus' writings gave the stimulus to others to continue in the search for chemical explanations of the bodily functions, and among these, a century later, was a Belgian, van Helmont by name, who by following in Paracelsus' trail, opened up a new science—the study of chemistry of living processes. He taught that the processes of life are dependent on the interactions of chemical substances, controlled by ferments. Van Helmont's work represents a combination of rare scientific skill and judgment with visionary Paracelsian mysticism: intellectually he was the Dr. Jeykll and Mr. Hyde of medical history; Dr. Jeykll when he worked in his laboratory on "gas," a term which he adopted for his chemical researches, and Mr. Hyde when he speculated in his study on "blas," the archaei and spirits which he believed were the servants of the soul. But the new science of biochemistry to which van Helmont's work gave birth made little progress, it was born prematurely, it could not grow on a soil barren of accurate chemical knowledge so that it is really only within the past few decades that the seedling which he planted has sprung into vigorous growth.

While these three sciences, Anatomy, Physiology and Biochemistry, were gradually being laid as the foundations of medicine, the study of disease itself was only slowly emancipating from the empiricism and mysticism of mediaeval times and no real progress was made until the principles of Hippocrates were reintroduced in its study, by the famous English physician, Thomas Sydenham. Working in a golden age of scientific endeavour, no doubt impressed and inspired by the brilliant scientific discoveries of his contemporaries, Robert Boyle, Hooke, Lower and Mayow, and influenced by the philosophic teachings of Francis Bacon and his friend John Locke, Sydenham revived the Hippocratic method of accurately recording the course of various diseases towards recovery or death, correlating the

symptoms, sifting out the significant from the accidental, and then arranging diseases in scientific groups; into species as it were, in the same way as botanists classify plants. He held also that the morbid changes in the organs, "the footsteps of disease," should be studied by anatomical investigation of the body after death, and these changes compared with the symptoms observed during life. Having achieved this natural history of diseases he then laid down a fixed and complete method of cure for each, disregarding all the hypotheses and speculations of those who based their treatment on the uncertain half-truths of Paracelsus, van Helmont and their followers. Clinical investigation became re-established as a science, and the ideals of Sydenham soon permeated the medical world.

And here we must draw the curtain on our historical setting and pass to the present scene, the medical science of to-day. The chief characters are the same as before—Anatomy, Physiology, Biochemistry and Clinical study; each is easily identified, but the stage is also crowded with others. To name the new characters would help but little in understanding the play, for it is quite clear that the independent acting which was so evident in the earlier scenes, is now replaced by the co-ordinated acting of all to achieve one common end.

Let us follow a part of the play, the discovery of the aseptic method in surgery, and we will see how this combined action of all the sciences overcomes the monster of disease.

The first step in the great discovery of asepsis was made by a pure chemist, Pasteur, and it consisted in the fact that minute living organisms cause fermentation in wine; then followed the application of this knowledge to explain putrefaction of organic materials exposed to air and with it the development of the conception of infection through micro-organisms transmitted by the air. All this being the work of a chemist, caused but little stir among the practising surgeons and physicians of the time; but there was one man who was at the same time sufficiently trained in the methods of thought of the scientist and familiar with the problem of the surgeon to grasp the significance of Pasteur's discoveries, who saw in them an explanation of the nature of the infection of wounds and of the suppuration and sepsis and gangrene which were enacting such a toll in human lives, especially in the surgical wards of the great hospitals. Needless to say this was Joseph Lister. Previous experience in physiological research and the possession of a keen clinical sense, acquired through long and patient bedside study, made it possible for him in his application of Pasteur's discoveries to the prevention of suppuration, to work out every essential detail necessary to success. For a moment let us return to Pasteur and the contributions which he made to medicine—and they are probably the greatest made by any one man — including, as they do, much more than actual discoveries of the causes and treatment of infections and diseases. Like Hippocrates and Vesalius and Harvey, he also introduced new methods of investigation and new systems of thought. The fact that vaccination with cow pox protects against smallpox had been discovered by Jenner, but it was Pasteur who founded the great science of immunology. Let me relate to you the experiment which convinced even the bitterest of his critics of the truth of his discovery. Pasteur undertook to carry out a crucial experiment to prove whether or not he could successfully vaccinate sheep against anthrax, a disease which was then devastating the flocks and herds of France. The test was begun on May 5th, 1882, at the Pouilly-le-Fort farm near Melun, and Pasteur's reputation hung on the result. A large crowd of farmers, veterinaries, doctors, and others gathered for the event, and most of them were sceptical to say the least. Fifty sheep were used in this experiment. Pasteur inoculated twenty-five of the sheep with his protective vaccine. On May 17th he gave the same animals a second protective vaccination. The other twenty-five were not vaccinated. On May 31st he declared the twenty-five vaccinated sheep "protected" and the unvaccinated ones "unprotected." Then he gave all fifty a full strength innoculation of anthrax virus. By June 5th, he predicted, all the unprotected sheep would be dead and all the protected sheep would be alive. He did not have to wait even that long for his results.

When he arrived at the farm on June 2nd twenty-two of the unprotected sheep were already dead and the other three dying. All the vaccinated animals were in perfect health. The sceptics were convinced, France rang with Pasteur's praises, and his methods were adopted everywhere. The saving of animal life in France, due to Pasteur's discoveries, more than paid the Prussian War indemnity of 1871, which amounted to five billions of francs. Any one with an imagination must realize that this also meant that millions of animals were saved from the suffering incident to disease. But more important still, it demonstrated to the world that a new weapon for the conquest of disease had been found.

Let us glance at another portion of the stage, in its setting of to-day, the work of the general practitioner. It is to him that is primarily entrusted the care of the sick; he must decide between what symptoms are benign and what are serious, and life or death often depends on his decision. His responsibilities are the most exacting that any man can be called upon to assume, but his work is at the same time the most interesting, provided his mind be trained in those methods of science by which the great discoveries of medicine and surgery have been achieved. A general practitioner unfamiliar with the structure of the human body, with the functions of its various parts and with the nature of the chemical processes by which it obtains from the food the energy necessary to drive the machinery of life, cannot hope to find, in the routine of his daily visitations of the sick, that stimulating influence which intellectual interest affords; and unless he be familiar with what is known of the nature of disease, and of the invisible agencies which are so often its cause, he can never be more than a mere empiricist.

He must know more than the bare facts of Anatomy, Physiology, Biochemistry, Bacteriology and Pathology, he must know something of their methods and, above all, their systems of thought, so that he may apply them in his daily practice. He must be imbued with the spirit of research, a trained observer and an intelligent experimentalist, capable of weighing the evidence which his bedside observations furnish. I do not mean to assert that the practice of medicine is solely a matter of applied science, it is far more, it is also an art. It requires great balance of judgment as well as a knowledge of man, of his susceptibilities and weaknesses, his love of sympathy, his mysticism. No system of therapeutics can fulfil its function unless it is applied with a full appreciation of the tremendous force of psychological influence. This is the art of medical practice.

But the general practitioners cannot fulfil these ideals unaided. Closely associated with him in his work is the specialist. Specialism in medicine and surgery is the inevitable outcome of the great expense of knowledge, an expanse which has far outstripped the comprehension of any single man. Many of these specialists are surgeons who by constant practice have acquired great manipulative skill in the performance of difficult operations; others are physicians who by restricting their attention to certain types of disease, have built up an experience which enables them to interpret more accurately the significance of the signs and symptoms. Both of these groups are assisted by a third, composed of laboratory workers, trained in the exact methods of biology, physics and chemistry in their application to the diagnosis and treatment of disease. Just as it is important that the general practitioner should know something of what each type of specialist is doing and of the limitations in his field, so also is it important that the specialist should have some knowledge of the problems of general practice; a principle which is so well recognized that a complete course in every subject of the medical curriculum is required of all who seek to specialize. True it may be that much of the general knowledge that is thus acquired may come, through disuse and want of practice, to be largely forgotten, but it is none the less essential to successful specialization. It provides that intangible something in scientific and clinical experience without which the specialist is apt to become a mere technician, and to lose sight of the fact that in rectifying some local disturbance he is also treating the patient. It is of the same importance to the specialist in Medicine that a general education is to the lawyer, or the clergyman or the publicist. Mo-

dern medicine is thus an exacting profession, highly organized, based on a knowledge of those sciences whose methods it employs, developed through a study of the structure and function of the normal human body and, finally completed by contact with disease itself, under the guidance of the recorded experience of the past and the established practice of the present.

Modern medical science, based as we have seen on the researches of Vesalius, Harvey, van Helmont and Sydenham, is one of the achievements of our age and no one can foretell in what direction the next great advances will be made. The conquest of the hidden forces of disease proceed much in the same manner as do armies in the field of battle. Long and patient preparation must precede the actual advance. Exploration and observation, organization of knowledge, experimental trial of possible methods of attack, realignment of forces, are the necessary antecedents to a real advance, and this is true in science, just as it is in warfare. Victory cannot be achieved without preparation, and even if some adventurous spirit may temporarily succeed in going beyond the front line trenches, his achievement can be of little value unless the new position is consolidated by the immediate advance of organized effort. During recent years many trenches of the enemy of disease have been captured and the positions consolidated, diphtheria and tetanus, typhoid and typhus, smallpox and anthrax, malaria and yellow fever, have either become extinct, or their virulence has become reduced so far that they are no longer the deadly scourges of mankind that they were, and many of the more chronic diseases, such as diabetes, syphilis, and gout have come under control.

And finally a few words with regard to the possibilities of the future. In what direction is research tending? How is the strategy of the attack developing against the apparently impregnable trenches of the enemy of disease; against those that are chronic and yet fatal such as cancer, tuberculosis, the obscure diseases of nutrition and the nervous system, and against those that are acute and infectious, such as pneumonia, influenza and the diseases of infancy. It is very hard to say, but I think it is clear that the greatest advances are likely to be made by the application of the principles laid down by van Helmont and so magnificently developed by Pasteur, that is by employment of the methods of the chemist. The activity of living cells, their growth and multiplication, the changes which they bring about in neighbouring cells through the ferments and toxins which they secrete, are all problems in biochemistry. The biologist observes these changes; he describes them and studies the conditions under which they occur, but to understand their causes, to determine the conditions which may retard or hasten them, requires a knowledge of the chemical interactions of which they are the outward manifestation. This is the problem of biochemistry, and just in proportion as our knowledge of the chemical structure of the building materials of the cell increases, so do we come to understand the controlling factors in nutrition and growth and sensescence and the mysterious interactions of toxins and antitoxins, vaccines and sera. Experimentation and experience have taught us that foods contain besides the actual fuel materials for the cell, minute quantities of highly active substances called vitamines which are essential in co-ordinating the chemical processes which together make up its activities. Without the vitamines the chemical processes within the cell become disorganized, nutrition fails and ultimately it ceases to function. We know also that drugs can alter the activities of the cell which they must do by affecting the chemical processes within them. But at present we know very little indeed of how these changes are brought about, so that the problem of the pharmacologist like that of the bacteriologist is coming more and more to depend on chemical methods of research.

Should the Nerve Impulse be Calssified as a Physical or Chemical Action?

J. M. D. OLMSTEAD

WITH the introduction of more refined methods of experimentation older hypotheses often have to go by the board. So it appears to be with our conception of the nerve impulse.

In 1912, A. V. Hill, using a delicate thermoelectric apparatus reported that during the passage of the nerve impulse no extra heat was evolved or at least the change was less than one ten millionth of a degree Centigrade. Furthermore the heat coefficient of the nerve impulse, the Q10, was calculated by Keith Lucas to be less than 2, i.e. the velocity of the nerve impulse was not doubled by arise of 10°C. These considerations together with the inability to record any change in nerve during the passage of an impulse other than the electrical changes of the action current firmly established the hypothesis that the nerve impulse was a purely physical action. It was considered to consist in a relatively simple local movement of ions towards or away from hypothetical membranes in the nerve.

A year after Hill's negative results on heat production in nerve Tashiro invented a machine which he called a "biometer," capable of measuring small amounts of CO_2. In his biometer the CO_2 given out by small bits of living tissue caused the formation of barium carbonate crystals on the surface of barium hydrate solution. Upon calibrating his instrument with known quantities of CO_2 he could calculate the rate of respiration in living tissues. He found that resting nerve produced 0.0055 mgm. of CO_2 per gm. of nerve per minute, and he obtained an increase of 100-200 per cent. upon stimulation.

This indicated that the nerve impulse involved the chemical change of oxidation, but if this were true heat should also be evolved. So confident were physiologists in A. V. Hill's results that every effort was made to disprove Tashiro's conclusion. Sir William Bayliss said that the effect was probably due to oxidation in the surrounding sheath cells being increased by the rise in temperature accompanying the electric current used for stimulation. Adams (1921) using Tashiro's biometer concluded that the rate of formation of the carbonate crystals was conditioned by the presence of dust particles on the surface of the barium hydrate, and therefore the method was unreliable quantitatively. Moore (1919) had already tried a more delicate colorimetric method for determination of CO_2 and claimed that there was no increase in CO_2 production upon stimulation.

Finally Parker in 1925 perfected a colorimetric method for determination of CO_2 which seemed to be the last word in delicacy. With his machine, which only possessed the disadvantage of considerable lag in registration, he found that the frog's sciatic and the dog-fish's lateral-line nerves both gave out 0.0055 mgm. of CO_2 per gram of nerve per minute at 88°C. This is Tashiro's old figure. But upon stimulation Parker found not a 100 per cent. increase in CO_2 output but one of about 25 per cent. He showed clearly that CO_2 is also given out by cells of the fascia and sheath, but if the nerve fibre is allowed to degenerate, and then the fascia and sheath stimulated there is no increase in CO_2 production over that evolved in the resting unstimulated state. Furthermore the electrodes in his machine were outside the chamber in which CO_2 was being collected and measured. Thus Bayliss' criticism could not apply to Parker's work.

A third investigator, Fenn, a pupil of A. V. Hill also reports that by an entirely different method from Tashiro's or Parker's, he has succeeded in measuring the extra CO_2 set free during stimulation of nerve.

Physiologists therefore are now agreed that the production of CO_2 does increase during the passage of the nerve impulse. If there is an increase in CO_2 production there should also be increased oxygen consumption. In the resting nerve three investigators have found that O_2 is used in amounts varying from 0.004 to 0.0012 cc. per grm. per minute. Two of them found an increase

upon stimulation. One of them was able to determine this increase quantitatively and found it to be approximately 100 per cent of the resting value.

Now A. V. Hill has within the last five months (Aug., 1926) published the account of a new thermopile by means of which he has found that prolonged stimulation of the frog's sciatic nerve causes an evolution of between 0.003 and 0.006 gram-calories of extra heat per gram per minute. It appears that in nerve as in muscle a carbohydrate, persumably glycogen, is oxidized. This would mean that the respiratory quotient of active nerve is I, hence the volume of CO_2 given out should be the same as the O_2 retained. From Hill's results there should be used 0.0006 to 0.0012 cc. O_2 per gram per minute, and like quantity of CO_2 given out. The agreement for increase in O_2 consumption in stimulated nerve comes to 0.0006 cc. per gram per minute, a good agreement, while the figure given by Tashira, 0.0043, is undoubtedly too high, though of the same order of magnitude.

Our present conclusion, therefore, is that the passage of the nerve impulse is of the nature of a chemical change, involving consumption of O_2, and evolution of CO_2 and heat. Quantitative relationships show that a carbohydrate (glycogen?) is oxidized. This suggests a relationship to energy changes in muscle contraction, which is further strengthened by the fact that in nervous tissue deprived of its circulation and therefore with oxidation suppressed, lactic acid accumulates. In muscle only one-fourth to one-fifth of the glycogen taking part in the reaction disappears, since three-quarters to four-fifths of the lactic acid formed is reinstated as glycogen, and the recovery heat evolved in the chemical reaction which restores the lactic acid back into glycogen is one and a half times the initial heat used in the contractile process. In nerve the recovery heat appears to be eight times the initial heat. The recovery process in nerve therefore does not exactly parallel that of muscle.

From these results we now know that the action current is not the only manifestation of energy change in nerve. The energy of a single action current traversing 1 gm. of nerve has been calculated at 3.5×10^{-10} calories, whereas the total heat production under the same circumstances would be 2.5×10^{-7}. Therefore, the energy involved in the action current is a very small fraction of the total energy change measured by the heat production, less than 1 per cent. of it.

Is some new refinement of technic going to upset this new hypothesis? That is very doubtful. The old hypothesis was based on negative findings and a negative is very hard to prove. Positive results are "a shoe of another colour."

Flat Feet.

D. R. MITCHELL, B.A., 2T7.

LITERALLY speaking, "Flat-feet" should be a term confined to those cases in which the arch of the foot either touches the ground or where it is so much lowered that it nearly touches. "Foot strain" would more nearly cover the American conception of what is included under the heading, "Flat-feet." The assumption is wrong that every case of foot strain is due to a broken-down arch which requires support. In fact foot strain may occur in the foot with the high arch as well as in the foot that is flattened. Again, people with flat feet seldom or never suffer from flat-foot as a pathological condition. In other words, people with flat feet need not necessarily suffer from their feet.

A brief consideration of the anatomy reveals an inherent weakness in the mechanical construction of the foot. Without engrossing details, of which you are all familiar, it is important to note that at all times the weight of the body is transmitted wholly through the astragalus to the ground, through the foot at its posterior third. The longitudinal arch of the foot is composed of two distinct parts; a strong, flat outer nearly fixed arch composed of os calcis, cuboid, and fourth and fifth metatarsals, and an inner portion weaker, more arched, more freely

movable and composed of os calcis, astragalus, scaphoid, and one, two or three cuneiforms and one, two and three metatarsals. It is apparent that as the astragalus does not enter into the formation of the outer arch, the whole weight of the body is directed up on the inner, weaker structure. Thus the inner side of the foot is the weaker, and the line of thrust is also to the inner side. Besides the transverse arch there is also a dorsal covexity of the heads of the metatarsals to give greater strength and elasticity to the forefoot. Important muscles in maintaining the arch are, the tibialis posticus attached to the tarsus except the astragalus, and to the second, third and fourth metatarsals in a fan-like arrangement, the flexor digitorum longus and accessories inserted into the bases of the last phalanges. The flexor digitorum brevis with the toes flexed expends all its force elevating the arch. The transverse arch at the mid-tarsal joint is supported by the tibialis posticus and peroneus longus and the arch formed by the metatarsal heads is supported by the transversus pedis.

The movements of the foot with which we are concerned are briefly these:

1. Plantar flexion at the ankle joint with some inversion and adduction.
2. Dorsal flexion at the ankle joint with some eversion and abduction.
3. Eversion in the tarsus in front of and below the astragalus.
4. Inversion in the tarsus in front of and below the astralagus.
5. Adduction in front of the astragalus and os calcis and joints of the forefoot.
6. Abduction in front of the astralagus and os calcis and joints of the forefoot.
7. Pronation a combination of abduction and eversion.
8. Supination a combination of abduction and inversion.

The most important ligament in supporting the arch of the foot is the inferior calcaneoscaphoid which is broad and thick, the fibers of which pass from the anterior surface of the sustentaculum tali, to the scaphoid supporting the head of the astralagus and forming part of the joint cavity. It contains some yellow elastic tissue from the tendon of the tibialis posticus at its insertion into the scaphoid. This allows a certain amount of stretching with subsequent contraction. The Planter fascia assists greatly in maintaining the arch and of all structures it is the "binding rod" of the arch.

As has been shown, the thrust or line of gravity is to the inside of the middle of the support and this is to the weaker side. The tendency thus is to capsize the arch of the foot inwards. Against this tendency it is protected by muscles and ligaments. An excess of superincumbent weight or a diminution of muscular power are to be considered as causes of foot strain. Foot strain becomes effective in causing pain in two ways:

1. Strain of muscles, joints and ligaments.
2. Wrongly distributed pressure.

Causes Predisposing to Foot Strain.

The Modern Shoe.

It is usually narrowed and pointed in the toe part instead of being wide and blunt. The great toe is displaced outward. In this position it cannot grip the ground firmly as it should to furnish a fixed point from which the muscle may serve in maintaining the arch. The toes are crippled and atrophy of the foot muscles occurs which should be of service in maintaining a painless arch. Cases not having cramped toes show marked development of the flexor digitorum brevis.

Aside from the shoe the main causes of foot strain are

1. Diminution of the muscular and ligamentous supports occuring during convalescence from illnesses, especially from childbirth, during menstruation, in rapid growth, in severe trauma to the leg which results in muscular atrophy and loss of muscle tone and in acute disease.

2. Excessive weight.

This includes body weight and lifting heavy articles. A typical case is the woman of middle life who becoming inactive, rapidly puts on fifteen to thirty pounds, the excess being enough to cause foot strain where the support had previously been adequate.

3. Over use of the feet, in standing or walking is a frequent cause of feet strain. This occurs in nurses and postmen. It is more liable to occur after periods of rest or in a sedentary person who is unused to being on his feet. Violent use of the feet

as in jumping and games played on hardwood floors also cause foot strain.

These three classes interact usually. For example, excessive weight is more harmful if the muscles are weak and the same may be said of over use.

Types of Foot.

There is no type of foot that can be classed as normal. In general there are three main types as determined by inspection of the weight-bearing positions.

1. The high arch where the foot touches the ground only in a round area under the heel and in an elliptical area under the forefoot. There may be projections showing that the front and back of the outer border touch.

2. The type generally described as normal shows a straight line for the outer border, narrowest where it corresponds with the fifth metatarsal. This straight line joins the areas for the forefoot and heel. This leaves a large dent where the arched part of the foot does not touch the ground and in like feet the dent will be the same in each impression.

3. The type to be described as flat foot is where the whole sole touches the ground and in severest cases the greatest width of weight bearing surface is opposite the scaphoid bone. There are many gradations of feet between these three classes, but as a rule they can be placed where they belong.

Of the three the flat foot type is the least common in normal individuals and the high arch and so-called "normal" arch are about evenly divided. With regard to the height of the arch the following conclusions were drawn by Hoffman, who analysed the height of the arch in three hundred bare-footed individuals at the World's Fair in St. Louis, none of whom had symptoms, and in five hundred Caucasians shoe wearers who were under treatment for foot strain and reached the following conclusions:

1. That there is no normal type of arch.

2. That the height and shape of the arch are of no value in estimating the strength and usefulness of the foot.

3. That normal feet present high, medium and low arches in nearly the same proportion as do feet with weakened arches.

One further type of foot must be mentioned that has an important influence on the mechanics of the foot. If the gastrocnomius is short the foot can only dorsiflex to a limited degree. Further flexion as in walking must occur in the fore part of the foot in front of the astragalus, thus in finishing the step and to a certain extent in standing undue pressure will come on the forefoot and undue strain will come on the ligaments supporting the arch.

Symptoms.

The symptoms arising from the superincumbent weight on the foot in forms of strain and pressure will next be considered Certain types foot are more liable to strain and others are more resistant, but why is not definitely known. Clear it is for mechanical reasons, however, that the foot with the high arch, the foot that is abducted and everted slightly and the foot with the short tendo Achillis are more liable to painful strain under unfavorable circumstances than are the other types. The first symptoms of foot strain generally noticed are that the feet become hot and uncomfortable, burn after use and perspire more than before. General and local stiffness come next, the feet stiffen with rest and are most uncomfortable when the patient is getting up in the morning and at night. Such patients are generally more comfortable after a day of rest and least comfortable after an active day. The circulation becomes disturbed, the blood is slow to return when pressed out of the skin, local and general swelling appears, the feet feel tight in the boot, and the gait becomes inelastic and clumsy with the tendency to walk with the feet everted and not to rise on the toes.

Pain and tenderness are generally present under the tubercle of the scaphoid, due chiefly to stretching of the inferior calcaneoscaphoid ligament. Pain and tenderness are also found particularly in everted feet, below the internal malleolus and along the ridge of the astragulo-calcanean joint, and running down the inner side of the os calcis. Occasionally it is found at the tip of the external malleolus and outer side of the os calcis. Pain on top of the tarsus is often noted. A common symptom under the tarsus is a dragging sensation in the arch along the course of the tibialis posticus and ten-

osynovitis accompanied by a silky crepitus of this muscle sometimes occurs. In acute cases the whole foot may become tender, red and swollen, to such a degree that the patient cannot endure the pain of walking; walking if it is possible is done in a shuffling manner with least possible muscular action.

Normal gait is characterized by gentle undulatory motion of the body's center of gravity. The supporting leg behind lengthens as the body goes forward by raising the heel and thus prevents the center of gravity from falling low. In flatfoot the whole of the sole remains in contact with the ground for fear of stretching the ligaments of the foot. The result is that the center of gravity describes the arc of a circle with each step. To thrust the center of gravity over the front heel the weight bearing leg is flexed and forcibly extended. Outward rotation of the feet and legs is a favorite device in this mode of walking so that the foot is turned over the inner border of the foot instead of in an antero posterior manner that would put stress on the ligaments of the foot. Synovitis may be caused in the knee with static disability of the feet. Backache especially manifested by sacral pain in the buttocks and back of the legs is often caused by short calf muscles. The trunk of the flat-footed tends to stoop because of the strain put in the lumbar and sacral muscles. Pain in one or both hips is sometimes associated with flat feet and excessive eversion. Cramps may occur in the soles of the feet and in leg muscles, especially when the calf muscles are short. In long and continued cases of foot strain a fluctuating swelling not necessarily painful may arise just anterior to the external malleolus or in front of the tendo Achillis. Of all the symptoms the most common is the pain and tenderness below the scaphoid. These symptoms are common to all the types of foot described. Stiffness and muscular spasm often occurs, especially in the peronaei and gastrocnemius. These complicate the conditions already existing.

Pressure Symptoms.

Symptoms of abnormal distribution of pressure are noticed in the everted foot. Whenever part of the sole of the foot is made to bear more weight than normal, and are found especially at the inner side of the heel and under the great toe. The inside of the sole of the boot wears accordingly and callosities are formed first under the second and third matatarsal heads and as the condition gets worse the callosities may extend medially to the heel. The skin is thickened and calloused perhaps in ridges or in circular patches and in acute cases these become painful. There may be definite thickening of the subcutaneous tissue underlying the callous.

Tender heel. This symptom is found mainly in the highly arched foot with small weight bearing surface. A tender area forms on the lower surface under the internal and external tubercles of the os calcis. It may be very tender and attributed to periostitis or bursitis. Osteophytes may form. If the modern heel were hollowed and not flat to receive the os calcis with its bony prominences this condition would not likely occur. As it is, the soft parts are contused by these bony prominences each time the foot is put down. This condition is frequently known as "Policeman's Heel."

Pressure symptoms of the fore foot are most pronounced in the highly-arched foot. The callosities form and may be very painful. They tend to reappear when removed or after they have disappeared following a long rest on resumption of walking or standing up against the leather of the boot.

Treatment.

The object of treatment is twofold. The first is to correct the abnormal thrust of the line of gravity on the foot so that the weight of the body falls on the foot in a proper fashion. The second is to remove pressure symptoms. Pain and impaired function are the indications for treating these causes. The flat foot, even the rigid flat foot, the low arch, the everted foot, and the foot with the short tendo Achilles should not be interfered with or treated mechanically unless they are sources of trouble or discomfort. This is a mistaken point in examining men for the army. For cosmetic reasons exception may be made. Treatment in general is required for three classes of cases: (1) Acute, painful feet in which the arch has or has not collapsed. (2) Rigid flatfoot in

which the arch has collapsed and become rigid, which may be a sequel to acute flatfoot. (3) Mobile cases which are tender when strained, but where muscular correction is possible. In general the object is to convert the first two types into the third and then follow general principles. Restoration of function as well as deformity should be the aim of treatment. Deformity is not completely removed until active and passive adduction and inversion are secured, for complete mobility is essential.

Treatment for the Acutely Painful Foot.

This type is seen in any nursing staff usually two to three months after entry into the hospital. Illnesses such as influenza, and conditions, excessive heat and trauma, often precede the onset of symptoms. Menstruation aggravates and may in some cases precipitate an attack. In other words the attacks are due primarily to muscle weakness and any slight extra strain brings this condition out.

Rest in the recumbent position is the first requisite, as such cases are practically sure to increase if the feet are continually used, no matter what treatment is followed. Hot baths in the acute stage with massage and baking as soon as the foot can be handled, is the best that can be devised early. As soon as the very acute stage is passed, the foot can be put up in plaster with much padding and molded into a correct position, or adhesive strapping may be used, which is much less likely to cause atrophy of the muscles. For this the foot is adducted and inverted and adhesive plaster straps about one inch wide are applied, one over-lapping the other. These start at the outer border of the foot, pass under the arch and up the leg half way to the knee. In very acute cases it is well to apply under the strapping a pad of felt, filling the arch of the foot. Weight-bearing exercises as a therapeutic measure are not to be advised until the acute stage is over, but active non-weight bearing exercises can be started as soon as they are not painful. In either type they are to be so directed as to cultivate and strengthen adduction and inversion of the foot. The adducters of the foot and plantar fexors should be strengthened; thus the forefoot should be adducted and inverted, then dorsiflexed as in the attitude of slight adduction over and over again at every opportunity. Tip-toe exercises are especially useful; the patient places the feet in the attitude of moderate inward rotation, raises the body on the toes to the extreme limit, the limbs being fully extended at the knees, then sinks slowly, resting the weight on the outer borders of the feet in the attitude of marked varus, twenty to one hundred times. This exercise is somewhat difficult and it cannot be carried out properly if there is any limitation of motion or sensitiveness at the mid-tarsal joints. The best of all exercises is, however, the proper walk in which the leverage of the foot is employed and in which the foot passes through the proper alternation of postures. In the proper walk the line of weight should be through the middle of the knee and ankle joints and through the head of the second metatarsal bone or nearly the center of the foot. As the body is propelled forward and the heel is drawn up the tibia rotates outwards and the strain is on the outer stronger part of the arch, thrown there because the first metatarsals are the longer. Thus the feet should be parallel. As one foot is advanced it bears weight momentarily on the heel, then it is born on the outside of the foot, and finally on the forepart of the foot as the heel is drawn up. The great toe gives the final impetus to this forward propulsion and thus at the end of the stride the person appears to toe in slightly. Walking other than this may be regarded as improper and calculated to do no good.

Treatment of Flatfoot.

The treatment of flatfoot, where the arch nearly or quite touches the ground, is not essentially different from the above. But again it must be stressed that although clumsy and unsightly, such a foot need not be necessarily painful. The gait in such patients is necessarily inelastic, the feet are everted and in walking the body sways somewhat from side to side. Real flatfoot is congenital or acquired. The former is severe, but not likely to be painful in later life, as is the acquired. Congenital cases are usually brought for treatment because of the unsightliness of the deformity and the

characteristic gait. Acquired flatfoot is of two types, Flexible and Rigid.

Flexible Flatfeet. In this, manipulation can restore the arch, but weight-bearing causes it to fall again with abduction and eversion. Advice is sought for pain, the symptoms being the same as already noted under the acutely painful foot, or for cosmetic reasons. When reposition of the foot becomes impossible, it is classified as a rigid flat foot. In young adults and children with flexible flatfeet cure can be established, but in middle age unless the deformity be counteracted with support, it will recur.

The general principles of treatment are: (1) Reduction of weight if present. (2) Muscle and general condition improved. (3) If over use preceded the strain such over use should be avoided as much as possible. (4) In children suffering from over work this condition should be rectified, especially during rapid growth. (5) If due to bad shoes they should be replaced by good ones. (6) Mechanical defects in the foot should be compensated for if present.

Tilted heels. The heel should be raised on the inner side one-third to one-quarter of an inch and possibly the inner side of the sole should be raised slightly. This tilts the foot on to its outer border, makes the patient toe in and brings the weight upon the foot in its position of strength. People with strained arches should never stand on bare feet or in stocking feet, for weight on the relaxed feet in the improper position stretches out the irritated structures and progress is delayed. Any walking without shoes should be done on tip-toes, then the muscles take the strain and not the ligaments. The heel and toe walk with feet parellel should be cultivated, as in this position the muscles are the supports. When the stage of irritability has not been present or is past, contrast baths of the feet in hot and cold water night and morning improve the muscle tone and stimulate the circulation. A strap of adhesive plaster around the scaphoid is often sufficient support to control pain when it exists in walking. Exercises may better be done in corrected shoes, as there is a tendency for the foot to slump after exercise in bare feet.

Foot Plates. The use of plates is usually abused. They are often used without attempt to change the balance of the body by building on the sole or to develop the muscles. The plates themselves are usually flanged on either side in an attempt to bring the weight on the outer side of the foot. This usually results in callouses and little good. It is exceptional for a case to come for treatment without some self-devised and self-prescribed plate. In some cases an arch support well molded to the shape of the sole may be of value along with exercises for the muscles, but the usual outcome of their use is atrophy of the foot muscles. Sir Robert Jones feels that mobilization under anaesthesia in cases severely enough distorted to warrant this treatment would reduce the use of plates to a minimum. Where it is not advisable to treat cases with mobilization and where building up the sole with exercise is not sufficient, boots made to fit the sole snugly and to furnish support for the sagging arch by a curved piece of steel in the shank is better treatment than the use of plates. Again, in some cases needing support a thin piece of steel covered with leather reaching from the back of the heel to just behind the metatarsal heads and curved to fit the foot of the individual, will act as a splint to an irritated arch, relieve drag and will in no way negative the tilted heel or the advocacy of exercises as previously outlined.

Mobilization.—Complete mobilization under anaesthesia is a very effective form of treatment for certain types of painful feet usually treated as flat feet. The symptoms are persistent, being due to adhesions. These are broken down, active movement is resumed and a good result is usually obtained. In all cases resistant to treatment accompanied at times by swelling adhesions should be suspected.

Treatment of Rigid Flat Foot.—This is a serious condition in which the flattened, adducted, everted foot cannot be corrected either by elevation of the arch or by correction of the other two elements of the deformity. It may be congenital, or it may be a result of over-strain in its acuter stages whether the over-strain is due to unaccustomed exertion in walking, to injury or weakness of the ligaments accompanied by mild infection. This emphasizes the need of proper treatment of the acute strain al-

ready alluded to as, if this important routine is neglected recovery of the ligaments may occur in a flat-footed position with stiffness in all joints.

If flat foot is accompanied by or caused by peroneal spasm the condition is very disabling. The treatment consists in section of the peroneal tendon followed by that for flat feet.

The flat foot need not necessarily be painful, indeed it is less so than the partially collapsed foot. Osteophytes especially in adults may arise and cause persistence of symptoms. Rigid flat foot of youth without arthritic changes can be corrected and in adults it can be improved by correction of faulty alignment. With arthritic changes results are poor.

Manipulation.—In painful cases of rigid flat foot under anaesthesia the foot should be made supple and flexible in all directions with a Thomas wrench. With the arch well molded, the foot at right angles to the leg adducted and everted, the foot is wrapped in flannel or sheet wadding and encased in plaster. Unless reduction by wrenching is complete pain will occur while the foot is in plaster, on account of unbroken adhesions or incompletely stretched ligaments. This process converts the foot into an acute traumatic foot and must undergo treatment for such as indicated for the acutely painful foot. The body weight must be deviated from the inner to the outer side of the foot, and external iron with tilting of the heel and sole being of assistance. Cases too rigid for stretching or with arthritic changes, are best treated by arthrodesis of the scaphoid astragulus and cuneiform bones. This is also applicable in congenital cases with bony changes, incision being done on the inner side of the foot.

Flat foot in children often arises in connection with knock-knees. The treatment already described with a brace is good treatment, along with correction of the knee deformity. The condition is usually recognized by prominence of the internal malleolus and the presence of pain. Spitzy uses a rubber ball under the scaphoid that makes the child throw its weight to the outer side of the foot.

Short tendo Achillis causing deformity is remedied usually by stretching in plaster and seldom if ever by tenotomy or lengthening. Many conditions such as spurs, bursitis, arthritis, and metatarsalgia must be carefully differentiated from foot strain.

Prenicious Anemia

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THE recognition of pernicious anemia is frequently one of the most difficult tasks assigned to the physician. The signs are often so indefinite that one rightly hesitates to crush a man with a diagnosis that up to the present has meant almost certain doom.

The etiology of pernicious or Addison's anemia is still unsolved. We do know that there is increased blood destruction, and the constant absence of free HCI, and the frequent history of glossitis suggest a gastro-intestinal origin. Evidence is gathered that the achlorhydria is frequently present for years before the onset of definite signs of pernicious anemia and we may ultimately find this to be a general rule. The absence of the antiseptic HCI may permit the entry of the specific organisms; we do know that the intestine contains more streptococci in pernicious anemia than in health and that extracts of the intestine are highly toxic. Its familial predilection may be also due to a transmitted acid deficiency.

Signs and Symptoms

Our patient, frequently a male of middle life, shows a peculiar lemon pallor, usually without wasting. He gives a history of early fatigue, loss of ambition, dyspnoea and palpitation on exertion, drowsiness, vague digestive disturbances and frequently a history of a sore tongue "as if scalded by hot tea." One may note the large flabby "bald" tongue,

and often the puffiness of the ankle and the ataxic or spastic gait. The cord changes should be especially emphasized, as they are frequently overlooked, occur in eighty per cent. of all moderately advanced cases and may, indeed, be the initial signs of the disease. The degenerative changes affect chiefly the posterior and lateral columns giving the picture of "subacute combined sclerosis," the posterior column lesions contributing the "pseudo-tabetic" signs of ataxic gait, rhombergism, lightning pains, "pins and needles" in the extremities, absent knee jerks and areas of anaesthesia, and the lateral column lesions the spastic changes, the positive Babinski and occasionally increased reflexes. One patient recently seen had been treated for tabes dorsalis for eight months. Two years ago another patient, ruddy faced, consulted the writer for "pins and needles" in the hands; his blood count and hemoglobin were normal but his smears showed early yet definite pernicious changes, a diagnosis confirmed by subsequent developments.

The blood picture gives us most help in diagnosis, although during remissions it may approach very closely to normal. The red cell count is lowered to a greater degree than is the hemoglobin, thus giving a color index higher than 1.0. No other disease shows such a preponderance of large red cells—the macrocytes. These are frequently up to 10 or 12 u. in diameter. The average cell is 8 of 8.5 n. in breadth as compared to the normal 7.6 u or the still lower diameter of the cells in secondary anemia. It is well to remember that cells shrink about one micron on drying in a smear and nearly two microns when stained. Megaloblasts, when found, are strongly suggestive of pernicious anemia, but they also accur in various skeletal tumors and, inasmuch as they are relatively rare in early perniciius anemia, one should not await their appearance to make a diagnosis. One finds a leucopenia, diminished platelets and mononuclears, and the polymorphs present are largely senile; i.e., the nuclei are multisegmented, many showing six or seven divisions. This "uebersegmentierung" is carefully noted by the Viennese, who attach considerable importance to this "shift to the right."

The Volume Index is urged by various writers as an aid in diagnosis. It has this advantage over the color index that while the C.I. may occasionally fall below 1.0, the V.I. never falls below 1.0 and averages about 1.19. No other anemia gives this reading. Prof. Graham thinks that the low color index encountered at times may be due to our faulty methods of determining the hemoglobin content. The volume of the cells is determined by centrifuging a few drops in the haematocrit or 10c.c. of citrated (istonic) blood in a straight walled centrifuge tube. The Volume Index is calculated as follows:

Percentage of packed cells found over the normal per centage of cells (46 per cent.), divided by the red cells count over the normal R.B.C.

Differential Diagnisis

While the foregoing signs are often present in a sufficient degree to permit us to make a definite diagnosis, we are, in many other cases, confronted with a much more difficult problem. Carcinoma of the stomach, for instance, may give one digestive disturbances, a lemon tint to the skin and an achlorhydria. Carcinoma usually shows loss of weight, positive X-ray findings, a decreasing urobilinogen content in the urine and leucocytosis. The free HCI may be present and has even been found increased. A large spleen suggests pernicious anemia rather than carcinoma of the stomach.

Anemia due to **sepsis** may confuse the diagnosis, especially if retinal and other hemorrhages occur. Here, however, we have chills, fever, a leucocytosis and the blood culture may be positive. The disease progresses more rapidly than do most cases of pernicious anemia.

Hemolytic icterus must at times be ruled out, due to the signs common to both diseases of slight jaundice, hemorrhages, enlargement of the spleen and increased urobilin and urobilinogen in the feces and urine. One must remember that hemolytic icterus shows no achylia and the erythrocytes show diminished resistance to hypotonic saline. In pernicious anemia there is a normal or an increased resistance of the red cells. There is also an increase in the mononuclears in hemolytic jaundice.

The anemia due to the **dibothriocephalus latus** is probably the most difficult to rule out. One should pay special attention to the stool

for any evidence of parasites and it may be of help to recall that in the helminthiasis anemia the skin tends to be a pale brown, rather than lemon tinted.

Treatment.

It is difficult to properly assess the various treatments employed, for we must remember that approximately all the cases have at least one remission—no matter how treated. Some of these remissions may last for years—five, seven or even longer. Most clinicians agree that symptomatic improvement follows the administration of acid hydrochlor. dil. How much should be given? The B.P. dose is quite inadequate. There is practically no germicidal activity below a free HCl. value of 10 per cent., and Shaw has determined that 1.5 to 2.5 drachms of acid hydrochlor. dil. (B.P.) given by the continuous method over a period of 2.25 hours following meals will restore the effective germicidal activity of the gastric juice. These large doses should be commenced gradually and the acid given in orangeade or other drinks which can be sipped over the long period prescribed. Some physicians favor the oral or hypodermic use of arsenic. Iron is not indicated.

Blood transfusion has yielded rapid and prolonged remissions in many cases, but the results are not constant and, as with the acid treatment, the patients sooner or later fail to respond. It is generally agreed that smaller transfusions of 300 to 500 c.c., frequently repeated, are more efficacious than a single large transfusion. To be effective, blood transfusion should be given early, not as a last resort.

Very recently Minot and Murphy have recommended a diet high in liver. This is combined with an abundance of fruits and fresh vegetables; fat is reduced to a minimum. The liver is varied at intervals with lamb's kidneys and a generous share of beef or mutton is also allowed. Such a diet, in cases studied so far, seems to improve the patients' condition quite rapidly and has a very favorable influence on the blood picture.

Chronic Arthritis

A General Consideration of Classification and Terminology.

A. A. FLETCHER, M.B.

"To study the phenomena of disease without books is to sail an uncharted sea, while to study without patients is not to go to sea at all."—Osler.

BUT launching out into the sea of chronic arthritis is no easy matter. It is a difficult disease and one that probably exceeds all others in frequency and chronicity. Its aetiology is obscure, the pathology and physiology only partially understood, the treatment in many cases uncertain and disappointing. Tradition and superstition and the vagaries of its clinical picture have resulted in a large and confusing terminology. Naturally enough one hears the demands for some workable classification of the arthropathies, but experience shows that our cases do not readily lend themselves to classification, and some general considerations may make clear some of the difficulties of terminology.

By chronic arthritis is meant a chronic disease of joints, characterized by certain changes in the soft tissue, cartilage and bone structures, often going on to deformity, believed by many to be the result of an infection, but in which no aetiological agent has been definitely established. This excludes the specific bacterial joint disease and those joint lesions which occur in the course of other disease processes, such as gout, rheumatic fever, tabes dorsalis, and so on. Notwithstanding the obscure nature of the aetiology of chronic arthritis many factors appear to take part in the production and course of the disease and terms descriptive of these factors have been introduced into present-day nomenclature, adding complexity to classification. Some of these difficulties may be illustrated by the discussion of two clinical cases.

In October a man, aged 40 years, de-

velops an antrum infection and following this both knees and one shoulder become acutely swollen and painful. The antrum is opened and drains freely, but the arthritis, while considerably less severe, continues. In the spring it gradually subsides, leaving the joints apparently normal, with the exception of some slight grating in the knees on movement. Later the patient shows a liability to recurrence of the arthritis. Trauma may start an attack, or fatigue, or exposure, or any flare-up of the antrum infection. This patient now has chronic arthritis. The joint condition present in this case has been variously called chronic infective arthritis, toxic arthritis, focal arthritic, rheumatoid arthritis, arthritis deformans and chronic rheumatism. The antrum infection, whether or not it be the sole cause, is at least the exciting cause, and the case is called by many one of chronic infective arthritis, but there are objections to this nomenclature. Because the antrum is infected can we say the joint is? In such cases there is as a rule exudation of fluid into the joint cavity, which, if drawn off, is found to contain some fibrin and a few polymorphonuclear leucocytes, but which on culture is sterile. After aspiration there is still much pain on movement and the capsular tissues are swollen or boggy. These tissues are also sterile on culture. It is conceivable that the lesion is a toxic one and this is believed to be so by some clinicians who will use the term toxic arthritis. A greater objection to both these terms is the difficulty in determining what cases shall be put into the infective or toxic groups. It is quite probable that in most of the chronic arthropathies focal infection is playing some part. But we meet cases showing this particular form of arthritis, in which no focus of infection can be found, or when a focus is found its removal does not result in any clinical benefit. There does not seem to be any special advantage in including such cases in the so-called infective group. It may further be pointed out that in the case above cited the presence of a focus is only part of the story. The persistence of the arthritis following the removal of the focus, the liability for the patient to develop arthritic lesions at a later date, and finally the frequent occurrence of infected antra and the relative infrequent occurrence of joint sequelae illustrate that some other factor or factors must play an essential role. The case may be considered from a clinical or pathological standpoint. The initial and prominent pathological change is the swelling and tenderness of the soft structures. Cases presenting this type of lesion may be grouped together under the head of periarticular arthritis. Or in view of the acute invasion of the soft structures, often with fever and sweating, some similarity of the disease to acute rheumatic fever is recognized and the disease called rheumatoid arthritis. In both these terms one will not be entirely consistent, for in periarticular arthritis if the condition persists it will go on to cartilagenous and bone change and certainly in its late stages it loses all its similarity to acute rheumatic disease. Arthritis deformans is commonly used for all forms of chronic arthritis which result in permanent pathological joint change. Chronic rheumatism should not be used. Rheumatism should be reserved for rheumatic heart disease of which arthritis may be a manifestation.

The following case is representative of another type:

A woman, aged 50, two years following the menopause complains of pain in the knees and fingers. The patient is on her feet during the day, and the pain in the knees is much worse toward evening. She finds that any slight injury for example, while washing dishes, will increase the pain in the fingers. Examination of the knees shows considerable tenderness and lipping along the articular margins. This lipping can also be demonstrated by X-ray. At the base of several of the distal phalanges are small nodules about the size of a split pea, which are quite hard. The skin over some of them is red and shiny and these nodules are quite tender to pressure. The patient weighs 190 pounds; height 5 feet 5 inches. She feels the cold very much and the basal metabolic rate is 92 per cent. The sugar tolerance is considerably lowered, as shown by the glycaemic reaction to 100 grams of glucose. Exposure and cold aggravate the joint pain. The treatment prescribed is rest in bed, a diet in which the starches are restricted and the calories lowered sufficiently to reduce her weight, and thyroid extract, grains ii.

once daily. This treatment results in complete relief of pain, but on returning to her usual household duties and to her old diet the arthritis recurs. She receives temporary benefit by various hydro and physiotherapeutic measures during one of these recurrences. As time goes in the hypertrophic bone changes increase slowly in spite of all treatment.

This patient has chronic arthritis which we will find called menopausal arthritis, endocrine arthritis, metabolic arthritis, osteo-arthritis, hypertrophic arthritis, degenerative arthritis and arthritis deformans. The nodules on the fingers were first described by Heberden and are usually known as Heberden's nodes. Here again we have numerous descriptive terms used to group various cases of arthritis, which have in common some aetiological feature or pathological joint lesion. Chronic arthritis follows the menopause with sufficient frequency to suggest that the menopausal or endocrine disturbances are the exciting causative factor, but as to whether or not this grouping is clinically worth while there will be some difference of opinion. It is beside the purpose of this article to pass any judgment on such a question. The obesity, the lowered metabolic rate, the low sugar tolerance and the response to diet and thyroid extract show also that metabolic disturbances are playing some part in the production of the disease, and on these grounds the case might reasonably be called one of metabolic arthritis. But in other cases it is difficult to decide when disordered metabolism may be or may not be an aetiological factor and the term is found unwieldly in clinical application. As in the first case, terms based on the principal pathological lesion will not be open to these objections. In its early stages the bone lesions are fairly characteristic and are readily recognised by X-ray. Hypertrophic bone changes occur, as a rule, in middle and late adult life, and the grouping of such cases under osteo-arthritis or hypertrophic arthritis brings together cases which have much clinical similarity.

In reviewing the question of classification one need not be influenced unduly by academic considerations, but rather guided by clinical expediency. There is no doubt that the disease presents a picture so varied that some form of classification is useful and some of the general features of the disease may be considered in this connection.

First: Joints may react to injury either by inflammation or by degeneration. Inflammatory reactions, on the one hand, are represented especially by oedema and round celled invasion of the soft tissues, and, on the other hand, degenerative lesions are represented by destruction of both cartilage and bone along with the formation of new bone (hypertrophic change). Inflammatory lesions tend to predominate in childhood and early adult life. Degenerative lesions predominate in the senscent cases. Secondly: In chronic arthritis a focus of infection can usually be found. Pemberton estimates the incidence at 70 per cent., and taking the cases by and large much benefit or even recovery will follow their radical treatment. The recognition of the part played by focal infection in arthritic disease constitutes one of the most important contributions to medicine during the last fifteen years, and the means of recognizing these foci has been to a large extent developed during the last decade, as for example by transillumination and X-ray of the paranasal sinuses, the X-raying of teeth, the determination of gall-bladder function with iodeikon, the development of methods of examination in genito-urinary, renal and gynaecological disease. And thirdly: A number of apparently unrelated factors exert an important influence on the disease, not only at its onset, but throughout its course and convalescence. That an attack of joint pain may follow or be made worse by exposure to cold and wet is common experience and the relief afforded by change to a warmer and more favourable climate may be as striking as that effected by the removal of foci of infection. This characteristic may be as much a feature of an old degenerative lesion as of a more acute inflammatory one. In fact, the old monoarticular arthritic may be as good a weather prophet as the young man whose disease began following exposure and infection. Observations like these made it evident that various forms of chronic arthritis have much in common and justify their inclusion under the one head, chronic arthritis. Many other factors appear to play an important role in individual cases: To

mention the more common—fatigue and its reverse lack of exercise, excessive or unbalanced diets, undernutrition, lack of sunlight, trauma, metabolic disturbances, obesity, endocrine disturbances, various intoxications and heredity. These factors must be carefully considered in mapping out the therapeutic programme, and their recognition is more important than classification.

Most patients are relieved by certain physical measures which influence the local circulation, such as: heat, electricity, massage, and these may be a useful adjunct towards the establishment of a more hygienic regime, especially more sleep, more rest, more recreation and so on.

With these principles in mind the much-desired classification becomes less important. The tendency for the disease to change with age from an inflammatory lesion to a degenerative one appears to be of fundamental importance on both prognostic and therapeutic grounds. In the former infection undoubtedly plays a more important part, and no effort should be spared in the search for a focus. If treatment is unsuccessful the prognosis becomes grave. In the latter form other causes should be more considered and it is to be remembered that, as a rule, the disease will run a more chronic course whether it be favourable or unfavorable. These two types form the basis for the classification generally used in clinical medicine. The inflammatory type may be called rheumatoid or periarticular arthritis and the degenerative type hypertrophic or osteo-arthritis. When some particular aetiological agent appears specially evident new terms will appear, such as infective arthritis; toxic arthritis, menopausal arthritis, or even arthritis psoriatica for the type which runs parallel to a coexistent psoriasis. These cases, however, will show most of the characteristics of a chronic arthritis and can, as a rule, be so grouped under the above heads. These all serve to emphasize that consideration of the individual case is the road to success in treatment.

Plaster Bandages.

MARY R. SHAFFNER, R.N.,
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EVEN the most unimaginative mind reads with an added interest and fascination any present-day reality which savours of the past. So we read that Hippocrates advocated the use of a gum and flour "hardening bandage" in a paper no doubt given before some academy meeting of antiquity. Thus stiffened bandages made of various materials and concoctions were used until the introduction of the Plaster of Paris bandages in the middle of the nineteenth century, though as early as the tenth, Arab physicians made crude gypsum casts for the treatment of fractured limbs.

There are always the conservative who cling to the old ideas, so the "new bandage" met with opposition, though some foresaw it would be destined to surpass all such then known types of bandages.

After years of ingenious and untiring work, with the realization before them that when perfected the quick setting, light, strong, expanding bandage would meet their expectations—the plaster bandage has gradually developed and its every-day application has been universally adopted by the surgical world.

The earth's crust has ten principal elements—one of them being Calcium, which occurs as a sulphate in the form of gypsum. Gypsum is found in large, evaporated beds in France, England, Nova Scotia and in some of the American States. Calcium Sulphate in nature contains no water, and is only very slightly soluble in it. Crude gypsum heated or calcined at about 300 degrees F, passes into this anhydrous state which absorbs water readily.

The chief constituent of Plaster of Paris is a "Half Hydrate" $2\ CaSO_4\ H_2O$, which on being combined with water forms a Dihydrate $CaSO_4\ 2\ H_2O$—a chemical union —or the process of setting. This setting depends on the relatively high solubility

of this "half hydrate" and the filamentary character of the precipitated gypsum—in other words the degree of refinement of the crude gypsum and the temperature used in the calcining process.

We purchase a very superior grade of Dental Plaster of Paris, which is used in two ways.

1. Loose Plaster.

Loose plaster is employed in the making of moulds or taking of impressions—for example of feet for arch supports. The required amount of water at about 70 degrees F. is poured in a bowl into which the loose plaster is gradually shaken. When the plaster ceases to sink, and not before, the mixture is stirred until it becomes smooth in constituency like very thick cream. Stirring during the addition of plaster produces lumps.

2. Plaster impregnated into the meshes of crinoline.

Plaster impregnated into crinoline is the most common form in which Plaster of Paris is employed in the Practice of Orthopaedic Surgery.

Crinoline is a loosely-woven fabric with about forty strands to the inch, the bolt being some three feet in width and any number of yards in length. Unsized crinoline is useless. Glue sized crinoline is not desirable, as even the smallest amount of glue inhibits the setting process of the plaster. In starch-sized crinoline the starch has no effect whatever upon the setting process, and the experienced hand can detect at once the difference in materials, and feel in the starch-sized, slightly roughened surface, a good crinoline, and anticipate the efficiency of the bandage.

Crinoline is torn in widths and lengths as required. A three-inch bandage is usually about four yards long. A quarter of an inch is allowed for ravels, as three or four threads on each edge of the bandage must be removed, then the bandage is ready to receive the plaster.

A flat plaster board is necessary, with a raised edge around three of the sides to keep the plaster off the floor. The board should be well filled with plaster on which the crinoline bandage is laid. Then the plaster must be rubbed with the palm of the hand evenly into the meshes of the bandage, avoiding leaving any loose plaster between the turns, as this will cake when the bandage is wet. A liberal amount of plaster must be used, however, as a certain amount is shaken out when the dry bandage is handled.

As the Plaster is rubbed into the crinoline the bandage is rolled, leaving an opening about an inch wide in the centre, and as each turn is added, make sure to see that it is fairly slack, but remember too loose a bandage will telescope. When completed the bandages should be stored in a covered tin, away from sterilizers and steam. Crinoline should not be rolled or stored, nor plaster bandages made near steam or dampness.

A deep basin lined with paper and filled with water at about 70 degrees F., should be ready to receive the plaster bandage which is dropped into it. When all bubbles have ceased, grasp the plaster firmly at both ends, squeezing it so that the plaster will not escape with the water, but will remain in the bandage. The bandage is then handed to the surgeon and another bandage placed immediately in the basin.

The paper lining is provided so that after the bandage wringing is over, and the basin left standing for a time, the plaster will fall to the bottom. The water may then be poured off, and the paper lifted out with the hard caked plaster adherent to it, and be disposed of in another manner than being turned down the sink to block the pipes.

The making of plaster bandages is not an easy task, and it takes about an hour to make from twelve to fifteen good bandages if the crinoline has been previously torn. Any nurse in the summer time for three consecutive hours, her gloved hand hot and tired from the constant rubbing motion and breathing in the chalk-like dust it creates, has often been tempted to leave her post because self-preservation instead of self-annihilation was uppermost in her mind.

The Medical Professon in Russia

M. RAYMERS, 2T9.

A COUNTRY that has a population of 180 millions, a country that includes subarctic regions of Siberia as well as subtropical regions of Crimea, Caucacus and Turkestan, which borders with cold Norway and Alaska on one side and warm India and Persia on the other, that is Russia—a country of unlimited possibilities.

Just on account of its vastness the control of epidemics in Russia was always a very difficult problem. Even as recently as 1920 Russia was struck by an epidemic of Typhus fever that spread with a terrible devastation throughout the whole country. In 1920 there broke out an epidemic of Cholera in the starving districts of Volga and Ukrainia. In the same year there were outbreaks of Bubonic Plague in the Kirgisian Steppes.

Anthrax is quite a common disease in that part of Russia, and a few cases of Glanders disease were registered at the time of the war. Malaria is very common in Turkestan, scurvy in the Polar regions, besides the occurance of Cardiac and Pulmonary disease, diabetes, appendicitis and other sicknesses that are common in temperate and subtropical regions all over the world.

There were only thirteen medical colleges in Russia which had to turn out practitioners for all these regions. Since very few of the embryo-doctors knew beforehand whether they were going to practice medicine in a region of scurvy or malaria, and certainly all of them would have cases of diphtheria just as often as diabetes, typhus just as well as typhoid fever, the emphasis in teaching could not be placed on the diseases of any one particular geographical region.

The medical course in Russia is divided into five years. The first two years are concerned with the premedical subjects, which in the University of Toronto are covered in the first, second and third year, while the last three years are designed for clinical work, patients being always in abundance to illustrate any disease.

In my time the lecturer of Histology and Embryology was Prof. Maximoff, to whom Professor Macleod referred last year as Dr. Maximoff of Chicago, and whose praiseworthy work in the Reticulo-Endothelial system of the body is worthy of mention. The lecturer in Physiology was Prof. Pavlov, who became famous for his work on the conditional reflex and the Physiology of Digestive Glands. There was in Petrograd also another Prof. Pavlov who occupied the chair of Dermatology and Syphilology, no relation to the Physiologist. And I remember how embarrassed I once felt while in the dining hall of the Medical Academy in Petrograd when I—a sophomore—volunteered to inform strangers about the time table of lectures of Dr. Pavlov—the physiologist, and these strangers who were students of the graduating year informed me that they were speaking about Dr. Pavlov, the Syphilologist.

At the beginning of this year I felt in this University just as if I were in my old college again, because the first time after my entering the University of Toronto the students were told by nearly every Professor that his particular subject was his most important one (and I am still undecided as to which one of them to believe). Russian Professors did not only tell us so, they actually thought so and behaved accordingly. Most of the students had to try their examinations more than a couple of times, even such examinations as Botany and Geology (To a Canadian medical student it may sound ridiculous but these two subjects together with Mineralogy and Chrystallography were actually included in our curriculum). Of course the system in Russia was entirely different from that in Canada. Laboratory work was carried on not by the whole class simultaneously but by small groups of fifteen to twenty students. Lectures were not arranged correspondingly, with the result that a student after missing a few lectures on account of his practical work would eventually lose all his interest in lectures, and all together stop attending them.

Studying was done from text-books, some of them as Dr. Maximoff's text-books on Cytology containing 1,000 pages, lectures be-

ing attended by very few. I remember our Professor of Zoology who had the reputation of being an excellent lecturer. The first term while he was lecturing on "The Laws of Biology," there was hardly any room in the Hall left. Not only medical students of the University but also of the other medical colleges and even art students were coming to listen to him. In the second term either because he started lecturing on special zoology or because of accumulation of work, things seemed to have changed completely. He had to lecture before an audience of five or six students. One day the weather being especially bad, the Professor found in the lecture room a solitary listener. This was really too much. The professor did not lecture that day, but informed the Medical Society that he was going to stop his lectures all together, if the students did not consider their attendance necessary. He was a favorite professor and next day he lectured before an audience of fifteen, but some of the Professors were not even that lucky. One of the lucky exceptions was Dr. Pavlov. His lectures were always crowded, but they were not lectures in the strict sense. They were rather demonstrations. Barking and screaming of dogs was heard all over the building, an anaesthetized dog was placed on the table, a demonstration was in progress and Dr. Pavlov, a whiskered old man, was delivering his lecture on physiology supplemented by his criticisms of the political events of the day.

As I said before the students used to get their information out of text-books, and they had to know their text-books too. Exams were oral, one could try his exams whenever he wanted, no compulsory date for all was set. An appointment with the Professor was all that was necessary. Such words as "repeating his year" did not exist in the student's vocabulary. A fellow who was plucked once, could try his exams once more a few weeks later. But the examiners expected the students to know the subject thoroughly. Very seldom it happened that a student would pass with honours. They nearly all knew enough to get an "A." But before passing with honours a great many of the students would have to visit the Professor's office quite a few times, before they could pass at all. A friend of mine tried his exams in Organic Chemistry seven times before he got credit for this subject—and he was not exceptionally dull either. On the exams of Osteology (introductive to Dissection of the Body) the Professor had a habit of showing one the small bones of the hand or foot or part of a long bone and would inquire in which arm or leg it belonged; I was asked on this exam at what age ossification centres appear in Humerus, Sphenoid bone and Calcaneus and at what age they unite.

I remember how astonished I was when on coming to my first lecture in the University of Petrograd, I saw that the room was filled with co-eds of various ages and appearances. In fact at the time I attended the University of Petrograd co-eds were in the majority there, male students being few in number, since most of the men have taken the course in engineering, the most popular course in the days of revolution, and girls flocked to medical colleges, yielding perhaps to their natural tendencies of taking care of the sick and wounded.

Even such high office as that of Vice-President of the Medical Society was held by a girl and she really was one of the most energetic and efficient women I have ever come across. The co-eds somehow did not stick to one another there, but mixed freely with male students in the lecture room, laboratories and clinics, took part in the general affairs of the students, in organization of the economical and even political basis of the life of the students, served as members of year, faculty and University Executives, addressed meetings, organized student's balls and dances and so on. It was surprising to see them adapting themselves so quickly to the surroundings, since it was only with the revolution that women were admitted to the Universities, being obliged before the revolution to enter special girls' colleges. However, since the co-eds were in the majority and since they treated us boys with sufficient respect, we did not dispute with them over offices.

There were no athletic activities in the Russian Universities. The three games played in Russia were soccer, tennis and croquet, but those who played them, played as private individuals, there being no teams representing colleges. But as a supplement for the

lack of the athletic activities. there were plenty of public debates and discussions. It was the mental side that was being developed by the students, sometimes at the expense of the physical side. As a rule the majority of the students did not have to support themselves and consequently they had plenty of time to read other books besides the text-books. There was also plenty of politics in colleges, this being the only sphere which was completely dominated by men. When in 1921 permission was given to elect the Student Administrative Council on a pure political basis, the candidates running were mostly men.

As I said above there were only thirteen medical colleges in Russia and while there were plenty of doctors in large cities, in the country the demand for doctors was always great. To improve the situation schools for orderlies, nurses and midwives were established. Immediately after graduating a doctor could get a government position somewhere in a distant country place, where he would be placed in charge of a small hospital with two or three nurses as assistants. I knew a fellow who graduated from the Military Medical Academy in Petrograd and was sent to Siberia, some where near Vladivostock. Of course it was not compulsory for a civil doctor to accept a position like this. They could choose themselves a place where to establish their practice, and no limitation was placed upon their choosing. After a doctor tried his government-exams, he was entitled to establish himself in any province of Russia.

In the general estimation public doctors stood very high in Russia. The people saw in them not only skilled specialists or business men, but educated people, representactive of the "Intelligentia" Class, men who could not only 'fix up" one's cold or indigestion but also take part in any cultural, educational or social work in Russia:—there were no patent medicines: chiropractors and other quacks did not exist. There are still some medicine men among a few semi-wild tribes in the Asiatic part of Russia, but even these tribes becoming more educated, lose their faith in these men and ask the government to send them doctors.

In the eighties of the last century during the great cholera epidemic in Russia, some ignorant persons spread rumours that doctors are secret murderers, sent to kill off the people; there were rumours that the doctors poisoned the wells. Rebellions of the commons followed and a few of the doctors, who were risking their lives in order to save lives of their fellow-creatures, were killed. The history of those days presents perhaps the darkest pages in the "History of Mobs," and the most outstanding pages in the History of Martyrs of the Medical Profession. But this was nearly a half century ago. Now the respect for doctors is great, their authority is high and this is certainly an important psychological factor, which aids the doctors in their fight against disease.

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*Physical Examination of the Chest.

In Cases Suspected of Pulmonary Tuberculosis and Summary of Diagnosis of Pulmonary Tuberculosis.

H. I. KINSEY, M.B.

Introduction.

THE procedure to be followed in making a physical examination is well known to every student. Each will develop his own technique, and for each his own is probably the best. The main point to be emphasized in all cases, however, is that each step in the examination (whether it be Inspection, Palpation, Percussion or Auscultation) should be thoroughly practised, because from each one is likely to obtain some contribution that may be of value in the final summing up of the case. More failures to detect physical signs that are present, are due to lack of thoroughness in making the examination, than are due to lack of knowledge of the nature of the signs.

*The subject matter of this article is taken largely from standards of diagnosis; Ontario Laennec Society.

This is particularly so in examining any case in which Tuberculosis is suspected.

Preparation of Patient.

The preparation of the patient for the examination deserves special attention. (1) It should be almost superfluous to say that the room should be suitably warm, well lighted, and as quiet as possible, and yet in many instances these points are entirely neglected. (2) The whole chest should be uncovered, both back and front, for it cannot be emphasized too strongly that this is necessary for any thorough examination of the chest. (3) The clothes should be fastened securely, but comfortably, about the waist, so that the position assumed by the patient may be one of complete muscular relaxation. Care should be taken also to place the patient in such a position as will produce, to as great an extent as possible, an unrestrained pose of the two sides as regards at least position and muscular tension. In examining the back the shoulders should be drooped so that the scapulae may cover as little as may be of the thoracic wall.

It is important also that the examiner should be prepared to mark on the chest by abbreviated signs, as the examination proceeds, any abnormalties noted—so that it may not be necessary to trust to memory at the conclusion of the examination in recording on a chart the abnormal findings.

In describing the application of the ordinary methods one does not presume to attempt an exhaustivq dissertation on the signs that each may reveal, but merely to mention suggestively certain points which are of particular value.

Inspection.

Inspection is a valuable method of examination, if it be not done too hurriedly, although it may not reveal much of value in very early tuberculosis. Inspection, of course, requires a good light. It reveals at once the shape of the thorax, which is as a rule in early cases of tuberculosis without abnormality.

There should be included not only an anterior and posterior view of the chest, but also a profile view. A view from above, downward, obtained by the examiner standing behind the patient, and looking over the shoulders, is frequently of value. Of the more important signs to be sought may be mentioned:

(1) Any retraction—such as the flattening of an apex, though of course this is not necessarily due to disease and in any case it is not a sign of early tuberculosis.

(2) Drooping of a shoulder—often found to be present on the affected side.

(3) Prominence of a clavicle or an exaggeration of a supraclavicular fossa.

(4) Muscular atrophy.

(5) Diminished expansion or lagging.

Other parts than the thorax should be viewed, viz., the pupils for unilateral dilation, the cheeks for flushing, the neck for an enlarged thyroid or scars of old cervical-adenitis, the skin for evidence of loss of vasomotor tone. One notices also, as it were unconsciously, the Constitution, the nutrition, the muscles, the subcutaneous fat, the color, the carriage of the body, the expression.

Inspection should include as well, examination of the larynx and the nasal passages, for the presence of any obstruction which may cause auscultatory changes in the chest, or for the presence of tuberculous involvement.

The triumvirate, teeth, tonsils and turbinates, have been found guilty in not a few instances of stirring up trouble in the chest, and they should, therefore, be thoroughly inspected. The inspection of the movements of the two sides is most important. It may, with advantage, be supplemented by palpation, as by combining touch and vision more accurate comparisons are likely to be made.

Palpation.

Palpation will detect, of course, enlarged cervical glands. These may or may not be tuberculous. It is also of value in detecting any lack of symmetry in the respiratory movement of the two sides. There may be: (1) Lagging of one side—or of part of one side—an apex or a base. (2) Limitation of expansion. (3) Interrupted or jerky movement. (4) Muscular spasm, described by Pottenger, may be looked for but is of doubtful value to the average examiner.

Percussion.

One should follow a definite plan of percussion, with particular objects in view, and which will also omit no part of the thorax.

The following has been found satisfactory:

Begin posteriorly on either side, just below the angle of the scapula with the shoulder drawn slightly forward. Percuss from this point to the lower border of the lung and here note the excursion. Now percuss from the original starting point to the apex and laterally in a direct line. Naturally, percussion over the spines and in the paravertebral region should not be omitted.

Anteriorly the same general plan may be adopted, with the patient lying down. It should include the auxillary areas, upper mediastinum, and superficial and deep cardiac dullness.

Percussion, which should as a rule be gentle, will when skillfully applied, usually reveal some alteration wherever there is a diagnosable lesion. Corresponding points should be compared on the two sides of the chest. If any impairment is by this method found on one side, then the clear side should be percussed from base to apex to detect areas of relative impairment, not revealed when one side was compared with the other. Impairment at any of the so-called sites of election, the apices of the lower lobes and the apices of the upper lobes, leads to investigation as to its extent, its depth, and as to whether or not impairment is present elsewhere.

Percussion should be performed before much deep breathing and forced cough is practised.

Topographical Percussion.

The careful mapping out of the apical resonance area of each lung is often of value. This has been called Kronig's isthmus and represents the apex of the lung.

The bases, also, at the end of inspiration and expiration should be compared, as well as the excursion on the two sides.

It should be kept in mind that between the percussion notes of the two apices there is normally a slight difference. One must not forget also that changes may be present, due to unequal muscular development, scoliosis, or other curvature of the spine; that in early cases, dullness may be absent or slight, or that the lung may be hyperresonant, due to emphysematous changes in an apex.

One should also percuss over the sternum, along the borders of the sternum, over the vertebrae, and along the vertebrae, to detect the presence of bronchial gland enlargement or other mediastinal involvement.

Auscultation.

Auscultation is, of course, never omitted. In fact it is often relied upon when evidence could be more accurately obtained by some of the other methods.

Any abnormality found on auscultation must be accounted for: either as a normal physiological difference between the two sides, or as an evidence of disease. If it be regarded as the latter it is important to note (1) whether it is heard over a wide area, or (2) is it localized, and (3) if so, where, and (4) is it persistently localized.

The entire chest should first be auscultated superficially, for the purpose of determining the normal vesicular murmur, peculiar to the individual.

The patient should breathe orally, and noiselessly, maintaining as far as possible, the normal ratio between inspiration and expiration (Bray).

After quiet breathing one should have the patient breathe forcibly and slightly more rapidly. Finally one should have the patient's expiration followed by cough, and then by moderate inspiration, thus often eliciting rales not otherwise heard. It is advisable at this point to impress on the patient the necessity of covering the nose and mouth during forced expiration or when coughing.

During the examination, the patient should if possible breathe thoracically, not abdominally.

The examiner should pay special attention

(1) To the supra-spinous fossae.
(2) To the supra-clavicular spaces.
(3) To the first and second inter-spaces.
(4) To the apices of the lower lobes.
(5) Areas in the high parts of the axilla.
(6) Bases of the lungs.

In the study of breath sounds, so many factors may cause them to vary so markedly,

that it becomes difficult to distinguish physiological from pathological conditions. Thus the character of the apical murmur may be altered by the force and time interval of the respiratory act, or broncho-vesicular breathing may be caused, or prolonged expiration accentuated, at right apex, by deviation of the trachea, by the pressure of an enlarged thyroid, by scoliosis with convexity to right in cervico-dorsal region, or by improper nasal or oral breathing.

Therefore, while changes in relative length and intensity of inspiration and expiration, may be of value, they are often misleading, and except in an early acute case are not as important as is the presence of rales, especially if heard in showers, localized and persistent.

Rales, extending continuously or even brokenly, from the apex downward, are very significant of tuberculosis (Heise). If heard on quiet respiration the disease is no longer incipient.

The rales of tuberculosis must not be confused with inconstant apical rales, occasionally heard at the end of inspiration, with sterno-clavicular crackle—diagnosed by having patient hold breath and rotate shoulder or with sternal and muscular sounds or crackles heard along the basal margins.

The examiner should remember that other non-tuberculous conditions, such as catarrh following influenza, bronchiectasis, pulmonary oedema in mitral stenosis, or arterial hypertension, may also give rise to rales.

Single Phase Auscultation.

In listening to the breath sounds what is known as single phase auscultation is an excellent method. In this inspiration and expiration are separately compared on the two sides of the chest.

The degree of importance of each of the usual methods of examination is clearly demonstrable by an analysis of the requirements under "Physical Signs" as laid down by the National Tuberculosis Association of the United States in classifying cases of tuberculosis as "incipient" or "moderately advanced."

Incipient (or Minimal) cases are described as having "Slight Infiltration limited to the apex of one or both lungs or a small part of one lobe" and these terms have been defined as follows

Slight Infiltration.

Physical signs of

(1) Slight prominence of the Clavicle. Detected by inspection.
(2) Lessened movement of the chest. Detected by inspection.
(3) Lessened movement of the base. Detected by inspection.
(4) Narrowing of apical resonance. Detected by percussion.
(5) Slight or no change in resonance. Detected by percussion.
(6) Distant or loud or harsh breathing. Detected by auscultation.
(7) With or without some change in rythm (prolonged expiration). Detected by auscultation.
(8) Vocal resonance possibly slightly increased. Detected by auscultation.
(9) Fine or moderately coarse rales present or absent. Detected by auscultation.

APEX—that portion of the lung situated above the clavicle and the third vertebral spine.

A SMALL PORTION OF THE LOBE—an area of one or two intercostal spaces of an area of 60 to 80 square cm. in extent according to the size of the patient.

Moderately Advanced.

"Localized consolidation, moderate in extent with little or no evidence of cavity formation; or infiltration more extensive than under minimal," and these terms have been defined as

Moderate Extent of Localized Consolidation.

(1) An area of one-half lobe or less, but may involve both apices. Detected by percussion.
(2) Marked dulness. Detected by percussion.
(3) Bronchial or decidedly broncho vesicular breathing. Detected by auscultation.
(4) Markedly increased vocal resonance. Detected by auscultation.
(5) Rales usually present. Detected by auscultation.

In conclusion it should be said (1) that when one does not discover physical signs it is wise, when the history and constitutional signs are suspicious, not to conclude that there is no lesion present, but merely that one has failed to locate it. (2) It may be impossible to determine definitely the presence or absence of clinical tuberculosis from a single physical examination. (3) The importance of physical examination in diagnosis of pulmonary tuberculosis has been over-emphasized (Brown). (4) Symptoms are a better and more accurate guide to activity than physical signs. (5) The disease is practically always more extensive than indicated by physical signs. (6) Apical conditions should be considered tuberculous until proven not to be; basal conditions, as non-tuberculous, until proven to be tuberculous.

Above all, one should not rely on physical signs alone for diagnosis of tuberculosis. All the information to be had by the use of all the different methods is required. If an error of this kind is made it will be true as Pottenger has well said, "The physician who is not expert in examining chests must not make his diagnosis depend upon auscultation or upon any other single method of examination. If he does he will diagnose only late tuberculosis."

Diagnosis of Pulmonary Tuberculosis.

One's difficulties in diagnosis lie in two directions. (1) Early diagnosis where usually the physical signs are few and difficult to find, and (2) Differential diagnosis, where the problem as a rule becomes a question of intrepretation of the signs present.

Here again if one carries in mind a definite plan, the pitfalls will not be so many or so deep.

The seven steps in diagnosis (after Krause) appeals to one as being a good working basis for the purpose.

(1) A careful history dating back to childhood and even birth, with particular reference as to contact. In this latter regard it should be remembered that it may require one, two or three or more years after contact before active manifestations of the disease may appear.

Also in taking a history the relapsing nature of tuberculosis should be born in mind. Particular attention should be paid to such conditions as Haemoptysis, Fistula-in-ano—Pleurisy.

(2) The appraisal of the general condition of the patient—noting

(a) Presence of toxaemia as exhibited by afternoon or evening temperature with or without night sweats.

(b) Accelerated pulse rate.

(c) Response to effort.

(d) Slight loss of weight or strength.

(e) Digestive or nervous disturbances.

Physical Examination.

(3) Thoroughness and care cannot be too greatly emphasized. One should possibly mention particularly the systematic and proper use of cough to elicit rales. Do not forget the special areas mentioned under "Physical Signs."

The finer changes in breath sounds require a special training to interpret. So that too much stress should not be laid on these in the beginning of one's practice. It must not be forgotten that there may be positive sputum and X-ray and yet no physical signs can be elicited. These are usually deep-seated lesions.

Sputum Examination.

(4) This when positive is conclusive, particularly on two successive tests, but is of no significance when negative. Do not be content with one or two tests. As many as twenty or more may be necessary.

X-ray Examination.

(5) This should only be considered as part of the examination and not, as has become a custom with some, the sole means of diagnosis. It, however, gives tangible evidence of pathology when such pathology is dense enough to give a shadow, and is good for deep-seated lesions. On the other hand, X-ray may be negative and physical signs be present. A recognition of its sphere and limitations is very essential.

(6) Minor Accessory Examinations.

(1) Intracutaneous and subcutaneous tuberculin tests are helpful in young

children, but of no particular value in adults.

(2) The complement fixation test.

(3) The inhibitive reaction (Caulfield).

(7) Correlation of All the Data.

This part of the work is possibly the most difficult. It is virtually "summing up the case for the jury." And in many instances it requires time and study, observation and several examinations, but such care will be amply repaid.

Snap diagnoses have no place in medicine and nowhere do they lead to more unfortunate consequences than in the problems of Pulmonary Tuberculosis.

BOOK REVIEW.

Common Procedures in the Practice of Paediatrics.

BY ALAN BROWN, M.B., and F. F. TISDALL, M.D. (TOR.).

DURING the last month there has come from the press a most welcome addition to medical literature. This is "Common Procedures in the Practice of Paediatrics."

For many years the results obtained in the Hospital for Sick Children by their particular methods of diagnosis and treatment have been regarded as well nigh miraculous but quite unattainable by the general practitioner. This volume presents in a clear and concise manner the more outstanding problems in paediatrics and gives a practical method of dealing with these in a scientific manner.

We would like to draw special attention to the chapters on Infant Feeding, Difficulties in Diagnosis and Laboratory Methods: "Many medical students and practitioners consider it necessary for one to be an expert mathematician in order to use a scientific method for the feeding of infants." The relatively few underlying principles are set forth in such a lucid manner that even one with little training in the subject should be able to utilize them with confidence. The detail is sufficiently exact to prevent any gross error, but it must be remembered that "to successfully feed infants one must combine the art with the science of infant feeding."

As an explanation for the inclusion of the chapter, Difficulties in Diagnosis, it is stated that "a review of the records of this hospital reveals the fact that certain diseases are very frequently overlooked by the physician in charge of the patient before admission to hospital." These conditions are presented in vivid, composite pictures and these should help to alleviate some of the difficulty.

Last in the book, but far from least in service to the practising physician, is Chapter X. on Laboratory Methods. Platelets from being a hazy impression become a readily accessible figure. There is no excuse for ignorance or imperfect technique.

The first two chapters on History Taking and Physical Examination give brief but comprehensive outlines which will be greatly appreciated, especially by the students.

The longest chapter is devoted to a study of the Pre-school and Adolescent Child. Malnutrition in older children is discussed and the treatment suggested. Habit formation with the insidious results which arise from its improper supervision are illuminated and an insight into this baffling period given. There is one sentence which gives a clue to the extensiveness of this subject—"usually the bad child is a sick child, the illness being either mental or physical or both." The other topics all recommend themselves by their titles.

We wish that more could have been included on the diagnosis of nutritional disturbances and the actual feeding in certain cases, but realize that a larger volume might have become a book of reference rather than a working manual which we feel will be a sheet anchor in distress during our first years in practice.

A.M.H., '27.
G.S.M., '27.

THE LOST NOTE.

I was seated one day at the bedside,
    I was weary and needed rest,
And my fingers wandered idly
    Over the patient's chest;
I had mapped out the cardiac dulness,
    And was gently percussing the lung,
When I struck one note that resounded
    Like a song from an angel's tongue.

It may have been up at the apex,
    It may have been down at the base,
But the source of that note that thrilled me
    I have never been able to trace;
It wasn't exactly skodaic,
    It certainly wasn't dull,
But it fell on my jaded spirit
    With a kind of infinite lull.

It wasn't dilated stomach,
    For the gastric resonance smote
On my ear like a horrible discord
    After this heavenly note;
I don't think 'twas over the sternum,
    It can't have been over the spine,
Yet it came from the chest of that patient,
    And hit me full in mine.

I've percussed every inch of the patient
    In a frenzy of hope and fear,
But that breath of heavenly music
    Has never soothed my ear;
I have thumped him with sledge-hammer violence,
    I have stroked him with sylph-like touch,
But never again have I heard it—
    That note I admired so much.

It may be with some new patient,
    It may be in some fresh ward,
I shall strike once more than glorious note
    Which my soul will always hoard;
And I know that I shall recall it,
    Though I miss each Physical Sign—
That note from the chest of the patient
    That hit me full in mine.

So day by day at the bedside
    You may see me pursue my quest,
And day by day you may watch me
    Percussing some likely chest;
If I perish without having heard it—
    That note that I love so well—
I trust I shall hear it in Heaven,
    Or forget it for ever in Hell.

R.B.P.—St. Bartholomew's Hospital Journal, Dec., 1908.

SPORTING NOTES.

Assault.

This year's Medical Assault-at-Arms, though lacking entrants from the higher years, brought forth a large number of budding pugilists and wrestlers from the junior years. The Freshmen produced from their ranks several real stars and rounded out a championship team. The Third Year representatives were second.

* * *

Basketball.

Play in the Sifton Cup series commenced shortly after Christmas and this year Meds. are represented by two strong teams. The Juniors have an all-star aggregation on which are several members of this and last year's junior Varsity squad. Manager Gord. Cock is confident that his team will be cup-winners. Manager Gord. Large, of the Seniors, though lacking outstanding stars, has a team of pluggers. Both teams are very much in the running for group honors.

* * *

Track.

Though the Arts team has made a runaway of the indoor inter-faculty track meet, Meds have won first place in three events. "Mo" Mitchell equalled the interfaculty record in winning that event. Duff Wilson was first in the mile run, while Evan Shute once again captured first place in the shot put.

* * *

Hockey.

Junior Meds. won their group in the Jenning Cup games after a series of rousing games. In the first round of the championship play-offs they were forced to give way to the strong senior Dent team. The score in this game, 2-0, indicates the closeness of the game. The Med. team was composed of J. C. Bennett, goal; R. B. Robinson and G. Sparrow, defence; R. Williams and D. O'Connor, wings; C. Aberhart, centre; R. Perras, G. Cock and B. D. Layton, spares.

The Senior team were runners-up in the group which Senior Dents won.

* * *

Baseball.

Indoor baseball is going stronger than ever this year and the medical teams—juniors and seniors—are still battling for group championships. The Seniors have won and lost once, while the Juniors have been equally fortunate.

Count—What were you doing at Daffydil?

Noa-Count — Shifting scenery behind the curtain.

Count—You mean shifting dullness in the epigastrium.

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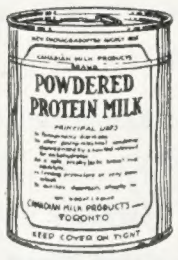

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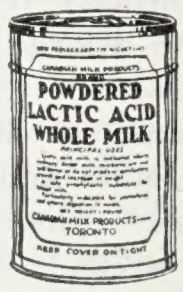

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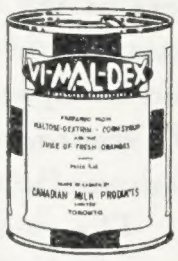

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